Washing Machine and Operation Control Method Thereof

TECHNICAL FIELD

The present invention relates to a washing machine, and more particularly, to a washing machine and operation control method thereof. Although the present invention is suitable for a wide scope of applications, it is particularly suitable for enhancing convenience of the machine in a manner of externally displaying detailed information of a laundry amount detecting operation due to a specific washing course and information of a corresponding washing progress.

BACKGROUND ART

Generally, a drum type washing machine performs washing using a frictional force between a laundry and a drum rotated by a drive force of a motor while a detergent, water and laundry are received within the drum. The drum type washing causes almost no damage to the laundry, prevents entanglement of the laundry and brings about washing effects of beating and rubbing.

Fig. 1 is a perspective diagram of a washing machine according to a related art.

Referring to Fig. 1, a drum type washing machine according to a related art consists of a cabinet 1 forming an exterior of the washing machine, a tub horizontally provided within the cabinet 1, a lifter (not shown in the drawing) rotatably provided within the tub 2 to lift a laundry upward so that the laundry can fall by gravity from a predetermined height, and a motor (not shown in the drawing) provided to a rear side of the tub 2 to generate a drive force.

An entrance of the laundry is provided to a central part of a front side of the cabinet 1 and a door 3 is provided to the entrance to open/close.

The washing machine further consists of a water supply valve (not shown in the drawing) switching clean water supplied via an external hose to supply water supplied from outside to the tub 2 and a detergent box (not shown in the drawing) having a detergent storage space, a water supply passage (not shown in the drawing) and an outlet to mix and discharge the water supplied within the washing machine with a previously stored detergent.

The washing machine further consists of a drain device (not shown in the drawing) draining the water from the tub externally. And, the drain device consists of a drain hose guiding the water of the tub and a drain pump pumping or switching the drained water.

Meanwhile, the washing machine further consists of a control unit (not shown in the drawing) controlling the motor, the water supply valve and the drain pump according to a user's operation or a detected laundry amount and a display unit 4 externally displaying washing cycles of the washing machine according to the control unit step by step.

Fig. 2 is an exemplary layout of a display unit of a washing machine according to a related art.

Referring to Fig. 2, a display unit 4 of a washing machine according to a related art consists of an LED (light emitting diode) window displaying washing, rinsing and dewatering cycles. The LED window, which includes light emitting diodes inside, projects light emitted from the light emitting diode(s) forward to inform a user of information about a washing cycle progress of the washing machine.

An operation of the above-configured washing machine according to the related art is explained as follows.

First of all, a laundry is inputted to the washing machine, the door 3 is closed,

and the washing machine is activated.

In activating the washing machine, a washing course setup is carried out.

The control unit controls the water supply valve according to the set washing course to supply water to the washing machine up to a predetermined water level. And, the water is supplied to the tub to be received therein.

Subsequently, the control unit drives the motor at a set RPM to rotate a drum. Filth is then removed from the laundry within the drum by the reaction with the water.

After completion of the washing cycle, the used and polluted water within the tub is drained outside the washing machine via the drain device. The washing machine carries out several rinsing cycles to remove the remaining detergent or suds from the laundry. And, the polluted water containing the detergent or suds is discharged outside the washing machine via the drain device.

After completion of the several rinsing cycles, a dewatering cycle is carried out in a manner of controlling the motor at high speed to dewater the laundry centrifugally.

However, in the above-configured and operating washing machine, the display unit can display a currently progressing step of the washing cycle only.

Hence, the user is unable to be informed of detailed information according to the washing progress.

For instance, in case of a selective washing course, which can decide a washing time, a washing water level, a rinsing current, a washing current and the like according to a laundry amount detection, instead of a normal washing course proceeding according to a set course, a washing course is changed according to a laundry amount each time the washing is executed. So, the user cannot be accurately informed of the detailed information of the progress of the washing cycle, thereby being more inconvenient.

DISCLOSURE OF THE INVENTION

Accordingly, the present invention is directed to a washing machine and operation control method thereof that substantially obviate one or more of the problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide a washing machine and operation control method thereof, by which user's convenience is considerably enhanced in a manner of detecting a laundry amount and displaying the laundry amount of the laundry, a corresponding water level, a washing time and the like.

Another object of the present invention is to provide a washing machine and operation control method thereof, by which a user is informed of an accurate washing progress situation in a manner of displaying washing information that is divided into a normal washing course and a selective washing course of which washing algorithm is decided according to a laundry amount detection.

A further object of the present invention is to provide a washing machine and operation control method thereof, by which a user is accurately informed of information contents represented by one display means in a manner of classifying displayed washing information according to its content.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims thereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, a washing machine according

to the present invention includes an input unit for selecting a washing course, a control unit controlling a washing cycle in a manner of detecting a laundry amount of a laundry according to the selected washing cycle and calculating and deciding data values necessary for washing according to the detected laundry amount or based on a predefined washing algorithm, and a display unit displaying progress information of the washing cycle according to the selected washing course on a plurality of areas by dividing the progress information according to contents of the progress information.

Preferably, the washing course inputted via the input unit is divided into a normal washing course using the predefined washing algorithm and a selective washing course using algorithm decided by calculating and deciding the data values necessary for the washing according to the detected laundry amount in the control unit.

More preferably, in case of the selective washing course, the data values calculated according to the detected laundry amount by the control unit to be necessary for the washing include a washing water level, a washing time, a rinsing current and a washing current.

Preferably, the control unit includes a laundry amount detecting unit calculating a washing water level and a washing time by detecting the laundry amount of the laundry and a display control unit displaying a selected course name, the display control unit controlling to display a washing water level and washing time message according to an announcement message or an operation result if the laundry amount detecting unit is activated.

Preferably, the display unit includes a first display unit displaying the selected washing course and a second display unit displaying information necessary for a progress of the selected washing course.

More preferably, the display unit is an LCD (liquid crystal display) configured

on one panel and each of the first and second display units is divided into a plurality of areas.

More preferably, each of the first and second display units is divided into upper and lower double lines.

More preferably, the first display unit displays a washing course and water temperature according to an external input or a laundry amount detection result of the laundry and the second display unit displays an announcement message according to the laundry amount detection or a washing time or washing water level according to an input of the input unit.

Preferably, the control unit further includes an operation database (DB) storing algorithm for an operation control of the washing machine or data necessary for a washing course progress.

To further achieve these and other advantages and in accordance with the purpose of the present invention, an operation control method of a washing machine includes the steps of inputting a washing course, detecting a laundry amount according to a selected washing course if an operation execution command is inputted, displaying a result message according to the detected laundry amount externally, and controlling a washing cycle according to a laundry amount detection result and displaying information according to a progress of the washing cycle externally, wherein the externally displayed information is divided according to corresponding contents to be displayed on a plurality of areas, respectively.

Preferably, an input of the washing course is divided into a normal washing course using predefined washing algorithm and a selective washing course using algorithm decided by calculating and deciding data values necessary for washing according to the laundry amount detection result.

Preferably, in case of a normal washing course using predefined washing algorithm, the laundry amount detecting step and a corresponding data calculating step are not carried out.

Preferably, in case of a selective washing course, an announcement message indicating the laundry amount is being detected is displayed from a time point of performing a laundry amount detection according to an input of an operation execution command to a time point of completing the laundry amount detection.

More preferably, if the laundry amount detection is completed, information of a corresponding washing water level and a corresponding washing time is externally displayed.

Preferably, information according to the selected washing course and a progress of the washing course is divided to be displayed on one LCD panel.

More preferably, the divided information is displayed by upper and lower double lines.

More preferably, a washing course and water temperature according to an external input or a laundry amount detection result of the laundry is displayed on one area and an announcement message according to the laundry amount detection or a washing time or washing water level according to an input of the input unit is displayed on the other area.

Preferably, in case of a normal washing course needing no laundry amount detection, the information according to a progress of the washing course is displayed using an operation database (DB) storing algorithm for an operation control of the washing machine or data necessary for the progress of the washing course.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to

provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

Fig. 1 is a perspective diagram of a washing machine according to a related art;

Fig. 2 is an exemplary layout of a display unit of a washing machine according to a related art;

Fig. 3 is a block diagram of a washing machine according to the present invention;

Figs. 4A to 4C are diagrams of a display unit of a washing machine according to the present invention; and

Fig. 5 is a flowchart of an operation control of a washing machine according to the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

First of all, since the basic configuration of a washing machine according to the present invention is similar to that of the related art, the detailed explanation of the basic configuration of the washing machine according to the present invention will be skipped in the following.

Fig. 3 is a block diagram of a washing machine according to the present invention and Figs. 4A to 4C are diagrams of a display unit of a washing machine according to the present invention.

The present invention classifies a display pattern to represent information on a display unit of a washing machine according to a washing course.

Namely, the display pattern is classified into a normal washing course and a selective washing course.

The normal washing course, in which the washing cycle is controlled using algorithm for an operation control of the washing machine without a laundry amount detecting step or an operation database storing data necessary for a washing course progress, is a washing course according to a user's selection.

And, the selective washing course is a washing course in which a washing time, a washing water level, a rinsing current, a washing current and the like are decided.

In case of the selective washing course, there is a message display for indicating that a laundry amount detection is in operation. And, the selective washing course includes an information display of corresponding calculation and decision.

Besides the display pattern division, a display area is divided and displayed on one display means to indicate each displayed information.

In case of using an LCD panel as a display means, the display area is divided into upper and lower double lines to display information according to a washing progress.

A washing machine according to the present invention, as shown in Fig. 3, includes an input unit 10 controlling a washing cycle in a manner of inputting signal by dividing the washing course into a normal washing course using a predefined washing algorithm and a selective washing course using algorithm decided by calculating data

values necessary for washing in a control unit and a control unit 20 executing the washing course according to an inputted operation command and a detected laundry amount in a manner of detecting a laundry amount of a laundry received within the washing machine if an operation command is inputted from the input unit 10.

And, the washing machine further includes a display unit 30 externally displaying the detected laundry amount and corresponding data of a washing water level and a washing time according to an operational mode following an input of the input unit 10 prior to the execution of the washing cycle, whereby a user can recognize the corresponding information and data.

The display unit 30 includes an LCD (liquid crystal display) instead of the related art LED window. The LCD includes a pair of thin glass substrates, liquid crystals between the glass substrates, and transparent electrodes. And, the LCD displays images in a manner of changing alignment direction of liquid crystal molecules to transmit or reflect light.

Moreover, the LCD included in the display unit 30 is configured to display data on upper and lower double lines to display the message.

The control unit 20 includes a laundry amount detecting unit 21 calculating the washing water level and the washing time by detecting the laundry amount of the laundry if an operation execution command according to a specific washing course is inputted from the input unit 10 and a display control unit 22 displaying a cycle course name if a specific washing cycle is selected by the input unit 10, the display control unit 22 allowing the display unit 30 to display an operation announcement message or a calculated washing water level and washing time message if the laundry amount detecting unit 21 is activated.

In this case, the display unit 30 includes a first display unit 31 displaying a

washing course and water temperature according to an external input or a detection result of the laundry and a second display unit 32 displaying the washing time, the laundry amount and the washing water level according to a laundry amount detection announcement message or the input of the input unit 10.

Hence, if the laundry amount detecting operation of the laundry is executed through the laundry amount detecting unit 21 after the selection of a specific washing course (Fig. 4A), the display unit 30 displays the laundry amount detection announcement message (Fig. 4B) and displays the corresponding calculated washing time or washing water level message after completion of the detecting operation (Fig. 4C).

Meanwhile, the control unit 20 further includes an operation DB 23 storing detailed cycle data including a water current degree against a specific laundry, washing water level, washing time and the like or washing cycle algorithm based on the data.

An operation of the above-configured washing machine according to the present invention is explained as follows.

Fig. 5 is a flowchart of an operation control of a washing machine according to the present invention.

Referring to Fig. 5, a laundry is received in a washing machine. Power is applied to the washing machine. A washing course for the laundry is then selected by an external input (S1).

In this case, the washing course selected by the external input conducted by a user can be divided into the following two cases.

Namely, the input of the washing course is divided into a normal washing course using predefined washing algorithm and a selective washing course using algorithm decided by calculating data values necessary for washing according to a

laundry amount detection result.

First of all, in case that a specific washing cycle course (selective washing course) of the selected washing course for a specific laundry is inputted (S2), if an operation execution command of the course is inputted (S3), a laundry amount of the laundry is detected and an operation announcement message indicating that the laundry amount is being detected is displayed via a display unit (S4).

Meanwhile, if the selected washing course is the washing cycle course (normal washing course) previously set in the washing machine, a laundry amount detecting step is not carried out. Instead, a washing water level and a washing time for the selected course is decided using an operation DB and a corresponding data message is externally displayed (S6).

After completion of the laundry amount detection of the laundry according to the selective washing course, a washing water level and a washing time data are calculated correspondingly (S5) and the washing water level and washing time data are externally displayed together with the detected laundry amount data via the display unit (S6).

Thereafter, the washing cycle is carried out according to the detected and calculated washing course data of the laundry (S7).

In the operation control method of the washing machine according to the present invention, the data of the washing progress is controlled to be displayed on an LCD panel by dividing the information according to the selected washing course and the progress of the washing course.

In doing so, each area is preferably divided into upper and lower double lines to display information.

The washing course and water temperature according to the external input or

the laundry amount detection result of the laundry are displayed on one area, while the washing time and washing water level according to an announcement message or the input of the input unit are displayed on the other area.

In case of the normal washing course that needs no laundry amount detection, the operation DB storing the algorithm for the operation control of the washing machine or the data necessary for the washing course progress is used in displaying the information according to the progress of the washing course.

The present invention displays the laundry amount detection, the laundry amount, the corresponding washing water level, the corresponding washing time and the like, thereby enhancing user's convenience considerably.

And, the present invention displays the washing information divided into the normal washing course and the selective washing course of which washing algorithm is decided according to the laundry amount detection, thereby enabling a user to recognize the washing progress situation accurately.

Moreover, the present invention classifies the displayed information according to the contents to be displayed on one display means, thereby enabling a user to accurately recognize the displayed information contents.

INDUSTRIAL APPLICABILITY

Accordingly, the present invention provides the following effects or advantages as follows.

First of all, the present invention externally displays the detailed items of the detected laundry amount, washing water level, washing time and the like according to the selected washing course, thereby enhancing user's convenience considerably.

Specifically, in case of the selective washing course of which washing

algorithm is decided according to the laundry amount detection, the present invention displays the message indicating that the laundry amount is being detected, thereby enabling a user to accurately recognize the currently proceeding operation.

Secondly, the present invention displays the corresponding information in a manner of dividing the display unit indicating the detailed items into a plurality of areas on one LC panel, thereby enabling a user to accurately recognize the necessary washing progress information.

While the present invention has been described and illustrated herein with reference to the preferred embodiments thereof, it will be apparent to those skilled in the art that various modifications and variations of displaying the detailed information of the washing progress according to the selected washing course externally and displaying the information of the washing cycle progress by dividing one display means into a plurality of areas can be made therein without departing from the spirit and scope of the invention. Thus, it is intended that the present invention covers the modifications and variations of this invention that come within the scope of the appended claims and their equivalents.

WHAT IS CLAIMED IS:

1. A washing machine comprising:

an input unit for selecting a washing course;

a control unit controlling a washing cycle in a manner of detecting a laundry amount of a laundry according to the selected washing cycle and calculating and deciding data values necessary for washing according to the detected laundry amount or based on a predefined washing algorithm; and

a display unit displaying progress information of the washing cycle according to the selected washing course on a plurality of areas by dividing the progress information according to contents of the progress information.

2. The washing machine of claim 1, wherein the washing course inputted via the input unit is divided into a normal washing course using the predefined washing algorithm and a selective washing course using algorithm decided by calculating and deciding the data values necessary for the washing according to the detected laundry amount in the control unit.

3. The washing machine of claim 2, wherein in case of the selective washing course, the data values calculated according to the detected laundry amount by the control unit to be necessary for the washing include a washing water level, a washing time, a rinsing current and a washing current.

4. The washing machine of claim 1, the control unit comprising:

a laundry amount detecting unit calculating a washing water level and a

washing time by detecting the laundry amount of the laundry; and

a display control unit displaying a selected course name, the display control unit controlling to display a washing water level and washing time message according to an announcement message or an operation result if the laundry amount detecting unit is activated.

5. The washing machine of claim 1, the display unit comprising:

a first display unit displaying the selected washing course; and

a second display unit displaying information necessary for a progress of the selected washing course.

6. The washing machine of claim 5, wherein the display unit is an LCD (liquid crystal display) configured on one panel and wherein each of the first and second display units is divided into a plurality of areas.

7. The washing machine of claim 6, wherein each of the first and second display units is divided into upper and lower double lines.

8. The washing machine of claim 5, wherein the first display unit displays a washing course and water temperature according to an external input or a laundry amount detection result of the laundry and wherein the second display unit displays an announcement message according to the laundry amount detection or a washing time or washing water level according to an input of the input unit.

9. The washing machine of claim 1, the control unit further comprising an

operation database (DB) storing algorithm for an operation control of the washing machine or data necessary for a washing course progress.

10. An operation control method of a washing machine, comprising the steps of:

inputting a washing course;

detecting a laundry amount according to a selected washing course if an operation execution command is inputted;

displaying a result message according to the detected laundry amount externally; and

controlling a washing cycle according to a laundry amount detection result and displaying information according to a progress of the washing cycle externally,

wherein the externally displayed information is divided according to corresponding contents to be displayed on a plurality of areas, respectively.

11. The operation control method of claim 10, wherein an input of the washing course is divided into a normal washing course using predefined washing algorithm and a selective washing course using algorithm decided by calculating and deciding data values necessary for washing according to the laundry amount detection result.

12. The operation control method of claim 10, wherein in case of a normal washing course using predefined washing algorithm, the laundry amount detecting step and a corresponding data calculating step are not carried out.

13. The operation control method of claim 10, wherein in case of a selective washing course, an announcement message indicating the laundry amount is being detected is displayed from a time point of performing a laundry amount detection according to an input of an operation execution command to a time point of completing the laundry amount detection.

14. The operation control method of claim 13, wherein if the laundry amount detection is completed, information of a corresponding washing water level and a corresponding washing time is externally displayed.

15. The operation control method of claim 10, wherein information according to the selected washing course and a progress of the washing course is divided to be displayed on one LCD panel.

16. The operation control method of claim 15, wherein the divided information is displayed by upper and lower double lines.

17. The operation control method of claim 15, wherein a washing course and water temperature according to an external input or a laundry amount detection result of the laundry is displayed on one area and wherein an announcement message according to the laundry amount detection or a washing time or washing water level according to an input of the input unit is displayed on the other area.

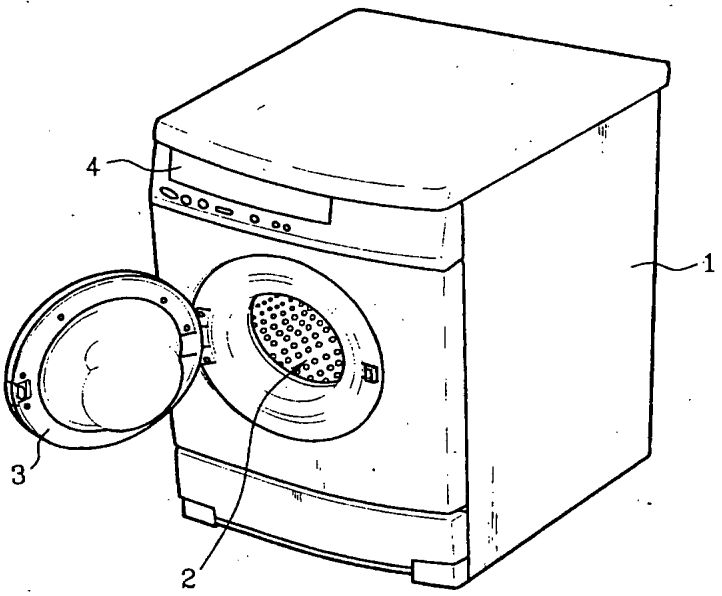
18. The operation control method of claim 10, wherein in case of a normal washing course needing no laundry amount detection, the information according to a

progress of the washing course is displayed using an operation database (DB) storing algorithm for an operation control of the washing machine or data necessary for the progress of the washing course.

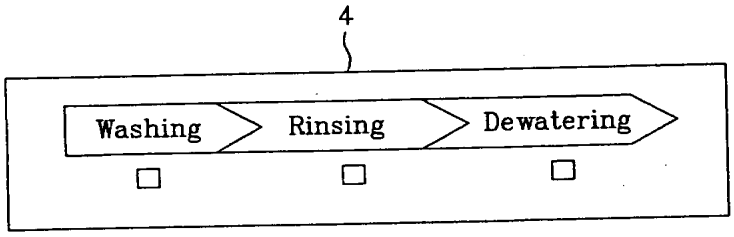
ABSTRACT OF THE DISCLOSURE

A washing machine and operation control method thereof are disclosed, by which user's convenience is considerably enhanced in a manner of detecting a laundry amount and displaying the laundry amount of the laundry, a corresponding water level, a washing time and the like. The present invention includes an input unit for selecting a washing course, a control unit controlling a washing cycle in a manner of detecting a laundry amount of a laundry according to the selected washing cycle and calculating and deciding data values necessary for washing according to the detected laundry amount or based on a predefined washing algorithm, and a display unit displaying progress information of the washing cycle according to the selected washing course on a plurality of areas by dividing the progress information according to contents of the progress information.

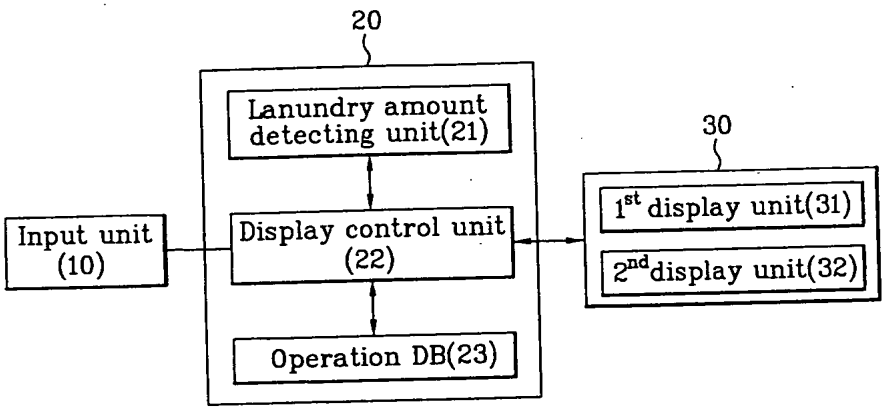
[Fig. 1]



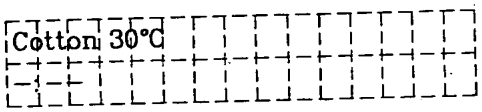
[Fig. 2]



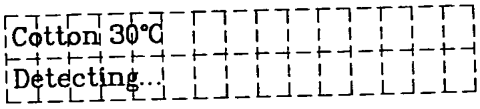
[Fig. 3]



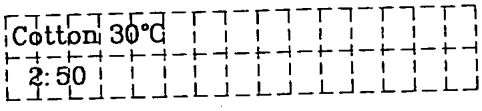
[Fig. 4]



[Fig. 5]



[Fig. 6]



[Fig. 7]